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SOMALI CURRENT STUDIED FROM SEASAT ALTIMETRY

C. Perigaud and J-F. Minster
Laboratoire de Physique et Chimie de l'Hydrosphere (LA 196)
Institut de Physique du Globe
75230 Paris cedex 05 - France

V. Zlotnicki
Department of Earth and Planetary Sciences
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

G. Balmino
Bureau Gravimetrique International
Centre National des Etudes Spatiales
18, avenue E. Belin
31055 Toulouse, France

ABSTRACT

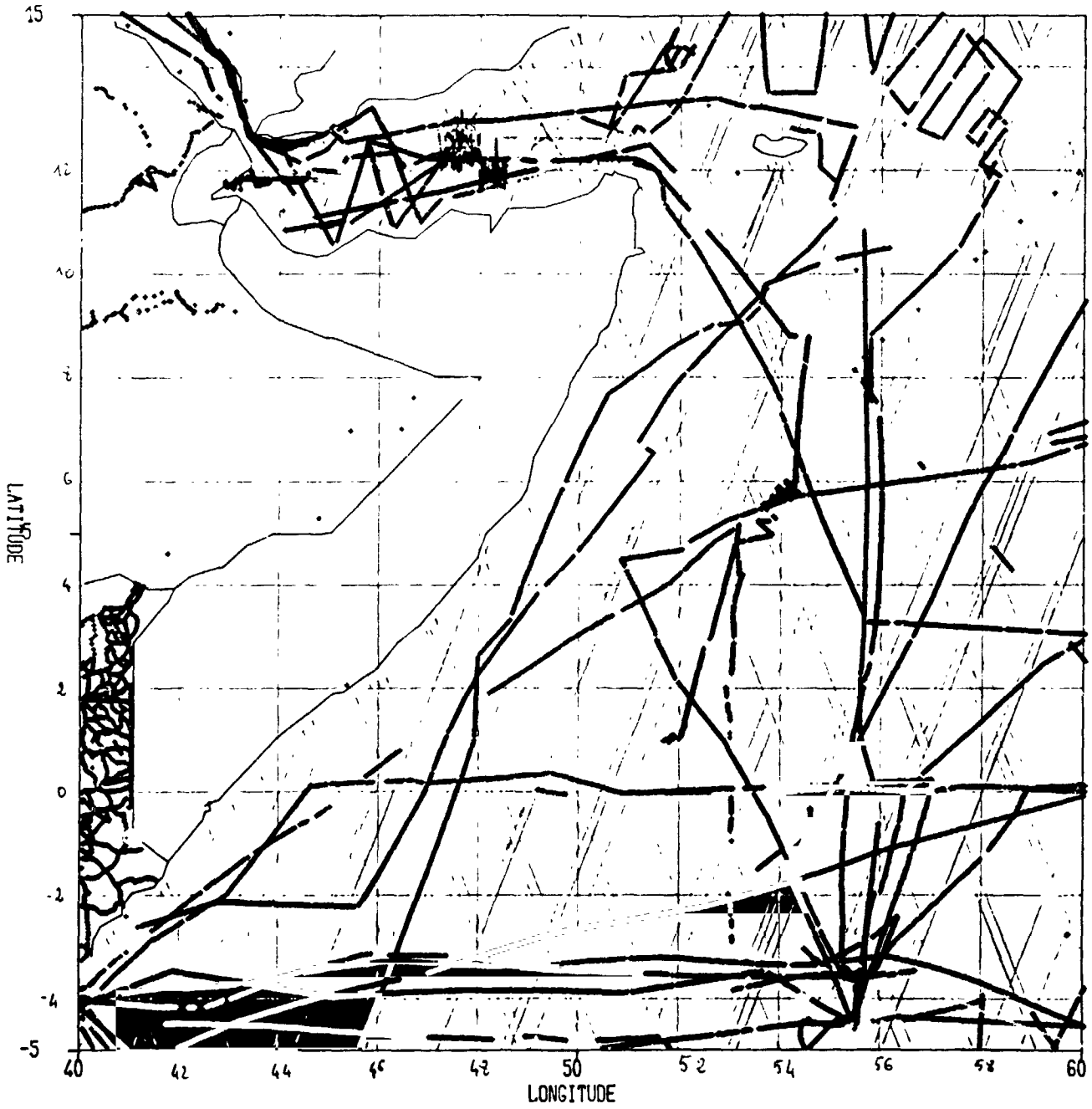
Mesoscale variability has been obtained for the world ocean from satellite altimetry by using the repetitive tracks data of Seasat (Cheney, R., 1982; Menard, Y., 1982). No significant results were obtained for the Somali current area for two main reasons: the repetitive tracks are too sparse to cover the expected eddy pattern and these data were obtained in late September and early October when the current is strongly decaying. The non repetitive period of Seasat offers the possibility to study a dozen of tracks parallel to the eddy axis or crossing it. These are used here to deduce the dynamic topography of the Somali current.

The first part of this work consists in reducing the errors on the data. Bad data are eliminated when the wave height is smaller than 10 centimeters or when the absolute value of the altimetric height above the Marsh mean sea surface is greater than 8 meters. Tides and orbit corrections are performed by calculating a bias for each track in order to minimize the crossover RMS difference; this difference is reduced from 2.55 meters to 29 centimeters. Then, tracks are compared between them in order to detect the eddy signal: tracks separated by less than 10 km can be assumed close enough with regard to the scale of the oceanic dynamic topography for their differences to be a measure of its variability; the gravimetric, bathymetric and magnetic data in the area give reasons to believe that the geoid is smooth there, and that the differences between these track data cannot be due to the gravity field.

Furthermore, this variability compares well with that deduced from XBT data obtained at the same period along the Tanker sea lane (Swallow, J.E. and M. Fieux, 1982): this lane is quasi-parallel to and superimposed with three Seasat tracks. The variability profiles show the same extremes at the same locations, and follow the same evolution with time: the maximum slope differences appear from 7° to 10° between early and late July (the height difference is 49.5 cm for

the Tanker data and 55 cm for Seasat). It decreases in August (respectively, 41.5 and 47 cm).

Finally, we are building a local geoid using a collocation inverse method to combine surface gravity data (see map) and altimetry: the repetitive tracks show no variability (which confirms that the current is quasi-inexistent at that time) and can be used as data for the local geoid. This should provide a measure of the absolute dynamic topography of the Somali current.



— Seasat tracks

▬ Gravimetric cruises